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AUGUST 1958



IN THIS ISSUE

The Special Milk Program

Consumption patterns for meat

A yardstick for custom feed mills

AGRICULTURAL MARKETING SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE

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Schools make use of a variety of serving times to increase milk consumption. These first graders get their extra milk at mid-morning.



These teenagers want more than the usual half pint of milk for lunch. Under the Special Milk Program, they get extra milk at a reduced rate.

THE SPECIAL MILK PROGRAM

by WALTER PATTERSON

The program encourages increased consumption of fluid milk through a system of reimbursement or incentive payments.

Availability of milk is a key factor for successful program.

MORE milk is being made available to children in schools and child-care institutions. It will mean bigger sales for the dairy industry.

This is a result of the enactment of legislation extending the Special Milk Program for another three years.

During the fiscal year ending June 30, 1958, nearly 2 billion half-pints of milk were served to children in 75,000 schools of high-school grade and under and nonprofit child-care institutions such as settlement houses, summer camps, child-care centers, and similar institutions. This is in addition to milk served in schools under the National School Lunch Program.

Authorization under which the program had operated expired June 30, 1958. But the prompt enactment of the new legislation means that the program now will continue without interruption. This action makes it possible for schools to make firm plans for their fall sessions.

The Special Milk Program encourages increased consumption of fluid milk through a system of reimbursement or incentive payments. These payments enable schools to expand their current service by offering milk at reduced prices or by establishing new times for milk service.

Availability of milk is a key factor in the success of the program. Dairy-men can work with schools and institutions in planning delivery schedules, and in helping them to overcome any other problems they may have in establishing or expanding a milk service to children.

Schools participating in the National School Lunch Program may receive reimbursement up to a maximum of 4 cents per half pint of milk served. But reimbursement is not made for the half pint of milk regularly served with the school lunch.

For other schools, the maximum rate of reimbursement for milk sold to children is 3 cents per half pint. The actual rate of reimbursement depends on the cost of milk to the

school, the proposed selling price, and the cost of handling milk within the school. Institutions and schools are permitted to use up to 1 cent of this reimbursement to defray handling costs. But, they must make maximum use of reimbursement to reduce the price of milk.

The program recently was improved and simplified for schools and child-care institutions where milk is not served as a separately priced item but is included along with other food and services provided for a set fee.

Schools and child-care institutions operating in this way submit a plan showing the specific methods and practices by which they intend to increase milk consumption. After the plan is approved and put into effect, schools and child-care institutions participating are reimbursed 2 cents per half pint on all milk served.

Nationally, this Special Milk Program is administered by USDA. In all States, this program is administered in public schools by the State's educational agency. In a number of States, some other agency of the State government handles the program in eligible institutions other than schools. In other States, however, AMS deals directly with nonprofit private schools and institutions.

The author, a student at the University of Nebraska, is working during the summer as an agricultural information specialist trainee in AMS.

A yardstick for CUSTOM FEED MILLS



by CARL J. VOSLOH, JR.

MOST operators of custom feed mills have a hard time deciding whether the service should pay for itself or whether profits from feed concentrates should be used to make up for a deficit service operation.

One problem is that the custom feed mill usually is a part of a larger business—a grain elevator, a commercial feed outlet, or a farm machinery business. As a result, costs of labor, buildings, equipment, and power get lost in the total enterprise.

Many of these mills are intended as a service to local farmers. Presumably, the manager is willing to take a loss on his custom feed milling if, through this service, he gains new customers for his main enterprise.

To establish a yardstick to measure the costs of custom milling, economists in the Marketing Research Division of AMS analyzed the operations of more than a hundred mills in the Midwest. Using these as a basis, they then set up, on paper, a typical stationary custom feed mill.

For this theoretical mill, researchers figured out the volume and services necessary to break even on service costs. To show what profit could

be realized, they added the income from the sale of concentrates. With this, the mill should bring in a profit of \$7,000.

Such would be the situation if the model mill ground and mixed about 2,000 tons of feed, ground an additional 1,500 tons of grain, bagged 400 tons of feed, and used 500 tons of concentrates.

If a plant operated below this volume, it would not be able to meet its service costs, and these would have to come out of the income from concentrates or from some other phase of the business.

Were the plant to operate on a larger volume, it would show a larger profit. It would also have the opportunity to reduce its charges and its concentrate markup.

The model mill used the average charges of the mills in the survey. Grinding and mixing charges were \$4.17 a ton; grinding only, \$2.90; bagging, \$1.50; and the concentrate markup, \$15 a ton.

Labor costs that went into the model plant were the result of using 2 men at \$1.50 per hour or 3 men at \$1 an hour. This was the usual number of workers employed and the wages paid in the plants studied.

In terms of the time needed for the different operations, one man alone could mix 2,500 tons of feed, grind 1,875 tons of grain, and bag an additional 500 tons a year. Most mill operators, however, feel the extra men are necessary to service the customers without undue delay. Furthermore, the custom mill is sometimes used to provide work for employees who might be unoccupied in another part of the business.

The model mill was designed around a 2-ton vertical mixer and a 75-horsepower hammermill. The cost of equipment required for weighing, unloading, and grinding ranged from \$11,200 to \$15,333, including installation and wiring.

The mixer cost from \$1,500 to \$2,500. The equipment used to load the grain into the mixer and to move feed from the mixer ranged from \$1,255 to \$1,889.

Total installed cost of all the equipment for the mill ran anywhere from \$13,955 to \$19,722. Depreciation was estimated at \$1,311 a year, and overhead was figured at \$3,742.

Power rates varied widely, running from 2 to 5 cents per kilowatt-hour. The average power cost for the model mill was \$2,404 a year.

In addition to all these costs, money frequently is needed for extra equipment such as crackers, crimpers, crushers, holding bins, platform scales, sewing machines for stitching the bags, and facilities for blending molasses. Since the model already had sufficient labor to handle the blending of molasses, additional labor costs were not included for this operation. The depreciation rate, however, would go up another \$271 when molasses-blending equipment was added. Power costs would rise about \$53.

These figures are based on the operation of a stationary mill. But marketing men say the costs and charges for a mobile custom mill would run about the same.

For either a stationary or mobile custom feed mill, then, the AMS model mill provides a good yardstick to assess costs and charges.



Bulk Shipping of NAVY BEANS

by JUDSON A. THOMPSON

NAVY BEANS may soon be moving in bulk shipments from Midwestern fields to Eastern canneries.

Shipping tests made by Agricultural Marketing Service have pretty much convinced canners and shippers—as well as AMS officials—that unbagged navy beans can make the trip to the processing plant in just as satisfactory a condition as bagged beans.

Right now, however, a few more detailed shipping tests are necessary as a final check. If the beans in these shipments come through without molding, without cracked seed coats, splits, or other deterioration, bulk shipping probably will be adopted by the entire industry.

So far, the beans have withstood the rigors of bulk movement without ill effect. They have had some help, though, from both shippers and canners; test shipments were handled with extreme care.

Special methods of conveying the beans into bulk cars will be necessary. Also, rigid temperature and humidity controls prior to loading will be helpful. To meet these requirements, both country shipper elevators and termi-

nal receiving plants will need to make changes in their plant operations.

Already a few aggressive firms who want to be among the first to take advantage of this easier, more economical shipping method, are making conversion plans.

The chief problem has been how to move the bulk beans into steel railroad cars without serious injury. Canners object to, and often reject, beans with split or cracked seed coats. Yet, any sudden impact of the beans against the car wall could cause damage, if not enough to show immediate injury, so that the beans will split or crack during processing.

This problem has now been solved by attaching canvas sleeves to the spouts of the dumpers. These sleeves direct the speed and fall of the beans and reduce the impact against the side of the car.

Moisture control has been the second headache of navy bean shippers and canners. Covered hopper cars get hot during summer months; and, if the moisture content of the beans is high, as well as the temperature, mold develops. Beans with more than 17-percent moisture become musty and moldy in just a few days if the temperature of the beans within the

hopper rises above 80 degrees. Even in relatively cool weather, the temperature within certain parts of a bulk shipment tends to increase. Just how serious this temperature change will be on quality is still being tested.

Once the problems of quality control are ironed out, the advantages of bulk shipping become impressive. Obviously, bulk shipments eliminate the long costly process of bagging and sewing, and the need for bag conveyors and hand trucks, and tedious hand stacking.

Loading time is reduced nearly 75 percent. It takes only 50 minutes to fill a hopper car with bulk beans compared to 3½ hours for the bagged product. This savings is twice made—at the beginning and at the end of the route.

Bulk handling also eliminates the cost of bulky pallets and the expense of dumping, cleaning, and marketing second-hand burlap bags.

As a final advantage, bulk shipping makes sampling much easier and more representative. The inspector gets a better sample from the continuous flow of beans than he does by probing 10 percent of the bags. This should result in less rejections at the cannery.

The author is a staff member of the Marketing Research Division of AMS.

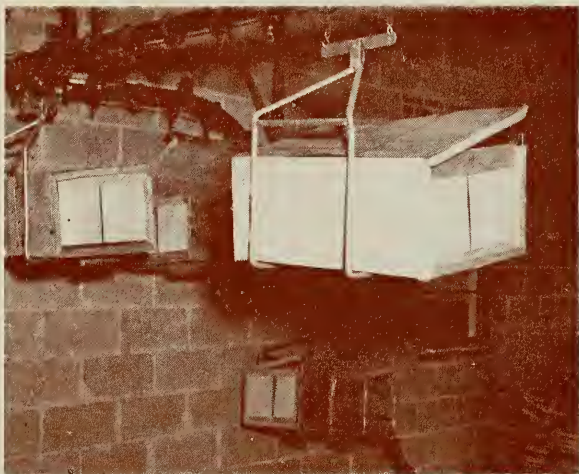
Cars are being loaded with bulk beans from elevator spout. Photo above shows spout in open hatch. By pulling chain, worker can regulate spout. Open canvas keeps the rain out.



ICE PACKING

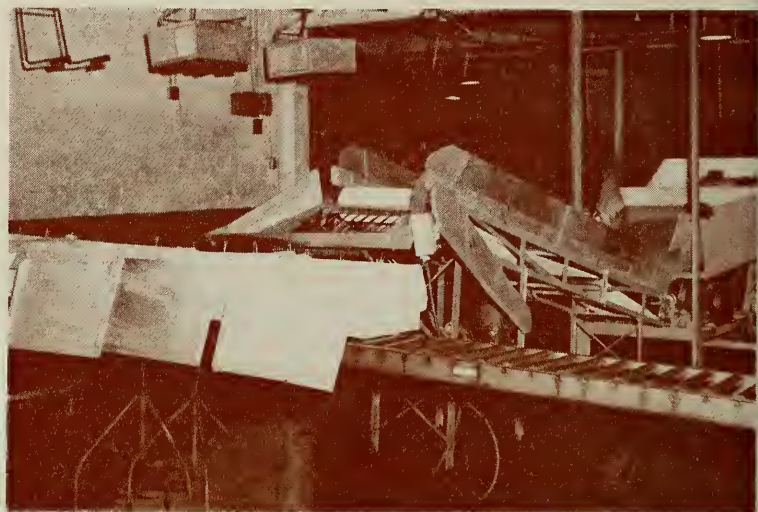
READY-TO-COOK POULTRY

This picture story shows some of the more efficient methods and equipment for ice-packing poultry. At left, below, a monorail cable conveyor with suspended carriers transports boxes to packing station. In photo at right, a tank tipper is used to dump poultry onto improved packing table.



The shaker-hopper, a component of the integrated packing line, moves the birds onto belt conveyor.

Conveyor belt receives birds from hopper, transfers them to packing apron, in position for box packing.



Boxes from the packers move along a 4- to 8-foot section of roller conveyor onto the scale platform.

To maintain a continuous fast pace, it takes two workers to fit lids into place over the crushed ice.



FORECASTING PEACH MATURITY IN COLORADO



EACH spring, Colorado peach growers play a costly, but necessary, guessing game. They try to predict when their crop will reach maturity.

In seasons of normal temperature fluctuations, predicting maturity isn't too hard a job. For the Standard Elberta variety—which accounts for the bulk of Colorado peach shipments—growers can figure it will take 126 days from time of full bloom until the first carload begins its trip to market.

But in an unusual year, growers sometimes miss the maturity date as much as 6 or 7 days. Instead of 126 days from bloom to basket, the peaches may mature in as few as 119 or as many as 131 days.

Either an early or late prediction can completely disrupt the marketing operation. Long before the first of July, growers and shippers must make plans for the packout. Nearly 4,000 migrant workers have to be scheduled for picking and packing.

About 35 Government inspectors must be ready to move in to check the crop since it comes under compulsory inspection. Buyers must be alerted, and truckers lined up for the final stage of the shipping process.

If something goes wrong with the maturity forecast, a lot of people are inconvenienced and a lot of money may be lost.

Each peach season, for example, between 3,000 and 4,000 migrant

workers move into Mesa County, Colorado, to pick and pack the Elberta crop. Too early a forecast brings these workers into the area before the peaches are ripe and ready to harvest. As a result, the workers stand idly by until the fruit ripens or they move on to another job. Too late a forecast means ripe fruit with shortage of labor to pick and pack it.

The problem is much the same for Government inspectors. They, too, come to Colorado from distant locations—often as far away as Texas and California. If they arrive before the peaches are ready for inspection, they have to stand by and wait for the peaches to be harvested. On the other hand, if inspectors don't reach the packing stations in time, shippers are unable to comply with inspection requirements.

Inaccurate maturity predictions also upset the tight schedules of the trucking firms that handle perishable commodities. Truckers either have their equipment tied up in a long wait or they leave and miss out on the deal entirely. A lack of trucking facilities sometimes works a serious hardship upon growers and shippers.

Other and less easily measured losses and costs are incurred by brokers and buyers who arrive too soon or too late.

What all these people need—the growers, the pickers and packers, the inspectors, and buyers—is a more accurate guide to peach maturity.

Agricultural Marketing Service Fruit and Vegetable Division men J. W. Gannaway and William J. Cremens have come up with a new method of forecasting maturity for Standard Elberta peaches that may prove to be substantially more accurate than that now used by the industry in Colorado.

This new method of forecasting maturity of Standard Elbertas is based on daily maximum temperatures prior to July 1, together with an additional adjustment for earliness of bloom. For cool days, they add a day or part of a day toward ripening date.

This procedure, tested with data for the seasons from 1931 through 1957, would have worked well even in years of unusual temperature fluctuations. In fact, for 1942 and 1939, years of extremely long and short growing periods, the new method would have been amazingly accurate. For 1942, Gannaway and Cremens would have missed the maturity date by a single day; for 1939, they would have hit it squarely on the nose. For these same years, the industry erred 5 and 7 days.

Whether the new method for Standard Elbertas will hold up for 1958, the first year of testing under actual field conditions, remains to be seen. However, any improvement in forecasting the maturity date of Colorado peaches will aid harvesting and marketing operations, effect financial savings, and reduce waste.

and the

MARKET for MEAT

by HAROLD F. BREIMYER
and CHARLOTTE A. KAUSE

A HOUSEWIFE who walks into a retail food store to buy meat makes different choices according to the level of her family's income.

If she has extra money to spend on meat, she is more likely to buy the higher priced cuts—if she is buying *beef* or *pork*. If she is selecting *veal* or *lamb*, the best bet is that she uses her added dollar to increase the quantity she buys.

That is to say, housewives seem to be especially quality conscious for *beef* and *pork*, but less so for the other two meats. Their concern with quality in *beef* and *pork* exceeds their desire to buy *more* of those meats.

Or so it was in the spring of 1955, a year of rising incomes and large meat supplies. And that's probably what would happen in any year under the same conditions.

In such a year, producers and sellers of livestock and packers and distributors of meat may have much to gain by giving attention to turning out a desired product.

This effect of income on choices for meat is one of the findings ob-

tained from a 1955 survey of food consumption by households in all sections of the United States.

But income has an influence on quantity bought, too. The survey shows that, in general, consumption of meat is closely associated with income. The larger the annual earnings of a family, the more meat it will eat, the more money it will spend for it.

Consumption of *beef* is clearly correlated with income. The relationship is sharpest in the South and in the West. For each 10 percent higher income per family, *beef* consumption per person was increased by percentages ranging from 1 percent in the North Central to 3.8 in the South (data are for city families).

Pork is less a "status" meat than *beef*. Somehow it does not command a superior place in the esteem—or the diets—of most families, especially those in cities. Only in the West, where it is more of a rarity than elsewhere, is consumption of *pork* positively associated with income: Per person *pork* consumption tends to increase with level of family income.

In the North Central and in the South high-income city families used less *pork* than the low-income group. In the Northeast, there is very little consumption differences among families with low or high incomes.

Consumption of *lamb* is highly associated with income. In the South and North Central region, *lamb* consumption is almost entirely confined to upper income groups. On the other hand, all income groups share the supply in the lamb-eating Northeast and West. Here, the relationship of consumption to income is less marked.

Veal consumption is also closely associated with income. Its average relationship is not as close as for *lamb* since it receives no extra boost from upper income families in the South and North Central as *lamb* does. They eat much more *lamb* than *veal*.

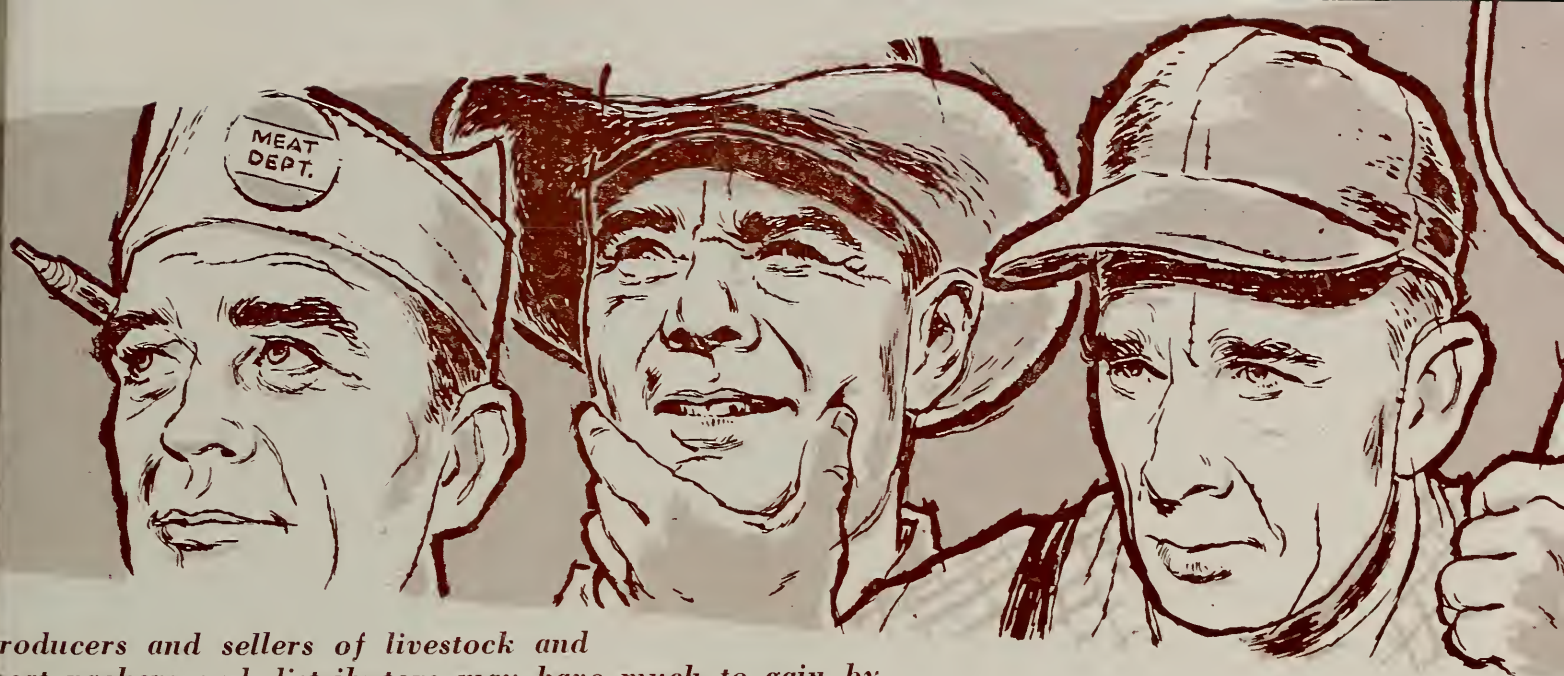
Variety and luncheon meats are consumed in small yet significant quantities by all income groups, low and high alike. Middle-income families eat the most luncheon meats—more than low income ones and more than high. Extreme groups, low and high, appear to consume the most variety meats (liver, heart, etc.).

Higher income groups eat more of the expensive cuts of *beef* such as steaks and roasts. But *ground beef* is equally popular in their families as in families of low income. *Stewing* and *boiling beef* is most popular with low-income families.

Ham, *chops*, and *bacon* are used about equal quantities by all income groups.

Mr. Breimyer is Head, Livestock Fats and Oils Section, Agricultural Economics Division of AMS. Miss Kause is a member of his staff.





Producers and sellers of livestock and meat packers and distributors may have much to gain by giving attention to turning out a desired product.

Most surprising in these *pork* data is that ham now enjoys no extra standing among high-income consumers. In a similar 1948 survey, consumption of smoked ham was found to be highly associated with income. If ham has indeed lost as much reputation with high-income consumers as 1948 and 1955 comparisons indicate, this by itself would explain much of the decline in total demand for *pork* that has taken place over the years.

Even for the same cut of meat the higher income families pay higher prices than do others. In the North Central States, for instance, the highest income groups paid, on the average, 15 cents per pound more than the lowest income group for round steak, 16½ cents more for sausage, and 29 cents more for ham.

The average price paid for all *beef* by North Central families averaged 58.5 cents for the lowest income group and 79.6 cents for the highest. The spread of 21 cents represents the combined effect of differences in the cuts eaten and in the price paid for each cut. The price range for all *pork* among North Central families was 20½ cents per pound.

Higher prices which high-income

consumers pay for beef are not surprising. That they also pay higher prices for pork, when they apparently regard the meat itself as prosaic and undistinguished, is a more engaging question.

Why is it that meat buyers with plenty of money to spend will buy no more of even the "best" pork cuts but yet regularly pay the highest prices for those they do buy?

Presumably they are responsive to premium quality, fancy wrap, and other inducements. A literal interpretation of the survey results shown here could very well be that a ham as such is no better than any other meat, but a good ham is worth a lot more than an ordinary one.

There are further implications. Varying prices for individual cuts of beef are easily possible through use of Federal grades. By 1955, when the survey was made, Federal grades had gained acceptance. They were widely used, particularly for the higher grades. It is to be expected that U.S. Choice roast (usually sold as such) would be priced higher than a Commercial one (often sold as "economy" beef or simply unidentified).

It is often said that consumers rec-

ognize no quality or grade distinctions in pork, and no Federal grades for pork were in use in 1955 (carcass grading for pork has only recently been made available). Yet consumers have found ways of picking what they regard as the better selections of any pork cut or product. Distributing many pork products, primarily cured ones, by trademark or brand aids the establishing of price differentials.

Although high-income consumers may be unenthusiastic about buying pork, when they do buy it they are just as selective for its kind and quality as they are for beef.

Consumers might eat more pork if they were assured of leaner pork. An expanded production of meat-type hogs may well be the solution.

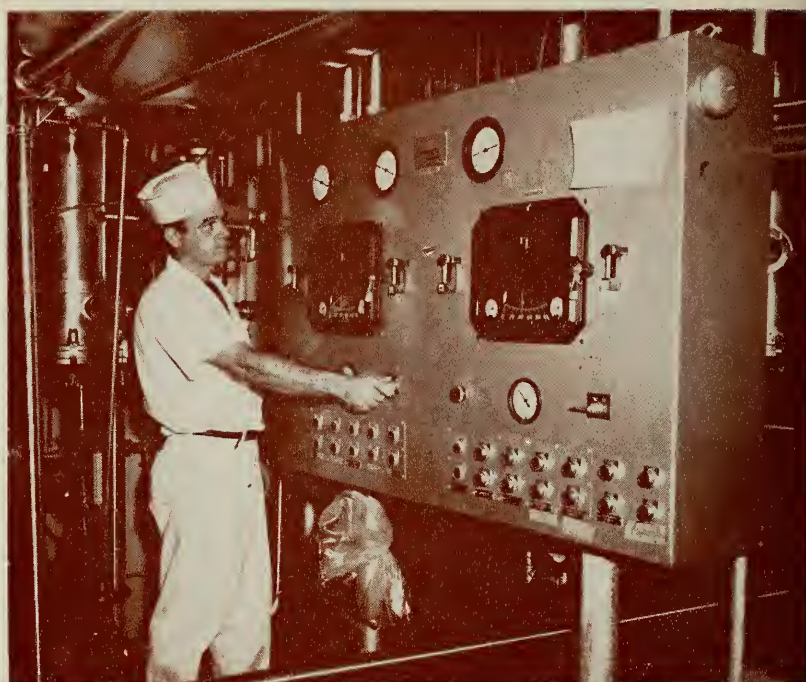
The emphasis on quality reported for 1955 may not hold true every year. But if the United States is going to enjoy the high prosperity we all hope for, and if meat supplies are going to be large for some years to come, the message is clear: Consumers of meat are highly selective about the quality of meat they buy and will pay more for the kind they like. Producers and marketers alike can well take heed.



DAIRY INDUSTRY IN TRANSITION

by HERBERT C. KRIESEL

Processors generally have welcomed the increased supplies of raw milk that have carried along an increase in their own dairy plant operations.



In a Maryland processing plant, the master control panel for the elaborate mechanism of the condensing equipment can regulate the flow of roughly 65,000 lbs. of milk an hour. The bulk of the output is shipped to manufacturers.

This is the final article in a series of three that describes changes taking place in the U. S. dairy industry. This month Herbert C. Kriesel discusses how production and marketing changes have affected dairy processors and distributors. The series began, in the June issue, with the part that farmers and marketers have played in the industry's transition. In the July issue, the author analyzed region-to-region shifts in production and utilization.

DAIRY processors and distributors have adjusted their operations since World War II to handle increased supplies of raw milk flowing from U. S. dairy farms. Plant capacity, methods of processing, and the products handled also have changed—as local and regional demands have shifted for fluid milk and for some manufactured products, and to meet the increased demand for new products such as ice milk and other frozen desserts.

Mr. Kriesel, a staff member of the Agricultural Economics Division of AMS, is editor of USDA's *Dairy Situation*.

Technological changes in processing and distributing have followed within this transition—partly due to the farmer's expanded operation and the widespread handling of milk in bulk tanks.

Finally, the Government's price support program has channeled increased amounts of milk into the manufacture of butter, American cheese, and nonfat dry milk—the three items purchased under the support program.

Processors generally have welcomed the increased supplies of raw milk that have carried along an increase in their own operations. They handled 56 percent more milk and cream combined in 1957 than 20 years earlier. Farmers' milk sales have risen with the expansion of dairy farms and as a larger proportion of the output has been marketed.

What's more, as dairymen have shifted to sales of whole milk rather than farm-separated cream, supplies of milk solids not fat for processing and distributing increased—the 1957 volume was nearly two and a half times greater than the volume sold in 1937.

The rise in U. S. milk marketings has been substantial, though the trend has varied from region to region. Furthermore, its effects on processors have not been uniform throughout the country. For example, some processors have shifted from manufactured products to fluid milk, as local demands for dairy items have shifted. Their fluid milk operations have gained particularly in regions of sharp population growth.

This pattern was set in the 19th century when the cheese industry in fast-growing New York gradually shifted into Wisconsin.

In recent times, Missouri's cheese output has grown substantially as the milk supply has increased. Milk production in excess of fluid needs in some fluid marketing areas of the southern States has been diverted to evaporated uses since the region is a major market for this product.

Processors have also adjusted their operations to meet the demands for new dairy products. Output of dry milk, for example, has expanded rapidly since before World War II. Gains for ice milk and other frozen desserts have been more recent.

Changes in supplies of milk and shifting demand for milk products show up in comparisons of the number and types of processors. For the U. S. as a whole, number of plants producing creamery butter dropped more than half between 1939 and 1956. The decline since 1945 also has been large—from 3,739 that year to 2,207 in 1956.

Broken down by States in the same period, the number of Minnesota creameries fell from 855 in 1939 to 555 in 1956. Creameries in Wisconsin declined from 567 to 214; in Iowa, from 495 to 315.

Declines in some States were proportionately larger, probably caused by more milk going into other manufactures. On the other hand, the number of creameries in North Dakota declined proportionately less—from 101 in 1939 to 93 in 1956. A large percentage of this State's milk output is from farm-separated cream.

The number of American cheese plants throughout the country has declined as processors have sought the efficiencies possible through an expanded scale of operation. American cheese output has held at a high level and usually has increased through the years (since World War II).

Plants in Wisconsin are typical of the large-scale processors, and the number of plants there dropped from 1,451 in 1939 to 780 in 1956. Number of plants in Iowa and Missouri gained, however, as their output of

American cheese has expanded greatly.

Number of evaporating plants in Wisconsin has been cut back—from 38 in 1939 to 16 in 1956. Much of this was due to the declining demand for evaporated milk, though there has been some shift of plants to southern States.

How has the increased scale of dairy farms been reflected in other areas of the processor's operation? First of all, it has meant fewer transactions and fewer supply sources to service, together with lower procurement costs. Furthermore, local health departments and other regulatory agencies concerned with quality of raw milk probably have fewer contacts to make. Lower inspection costs (for all parties concerned) probably results.

Another technological change—bulk tanks for cooling and storing milk on farms—has improved milk quality and reduced costs of transport.

Furthermore, this enables the processor to buy milk from more distant areas and allows him to compete for his supplies in a wider geographical area. The use of nonreturnable paper cartons for packaging fluid milk has widened his distributing area.

Government price support programs in the postwar years of rising milk supplies have been big influences on processors and distributors. CCC purchases under the programs have been solely of butter, American cheese, and nonfat dry milk.

As a result, processors have channeled increasing amounts of milk into manufacture of these three items. Output of each of these three items probably has been larger than it would have been with no support.

The program has provided a ready outlet for these items at no unusual selling costs for those firms which use it.

However, it is significant that many dairy manufacturing firms have long operated on a relatively small scale. Many of these firms have operated by selling less than car lots of products and without providing financing to await settlement time comparable to that entailed in selling to the Government.

As a result, the output of many of these plants is sold to intermediate handlers who in turn sell the product to the Government.

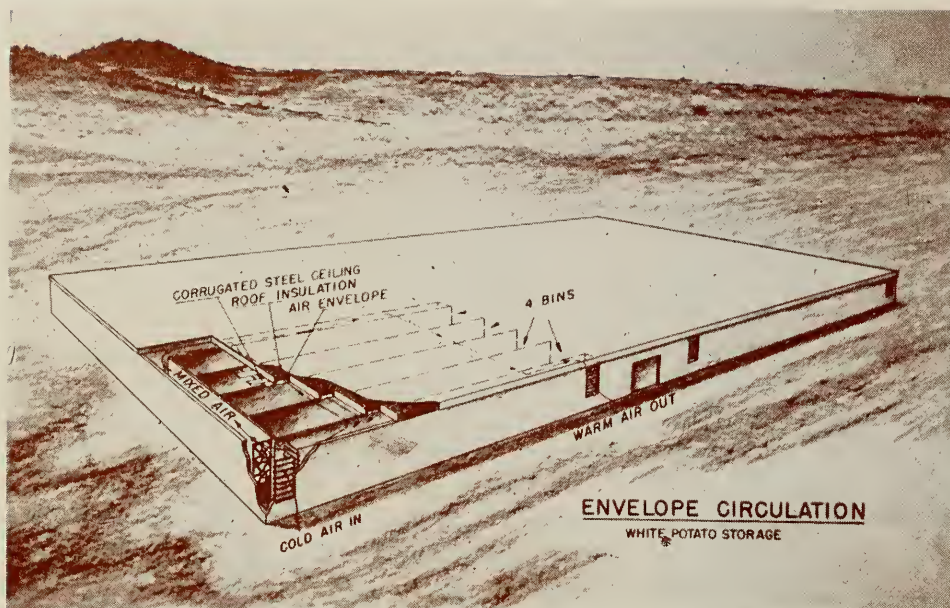
In some instances, the conditions for selling to the Government have been met by the plant itself by enlarging its operation and arranging for the necessary financing.

Because the price support purchases are in terms of specific grades, more plants necessarily have marketed their products by grades since price support has been important.

Continuing rapid changes in the dairy industry bring out new problems. Just as it has done in the past, *research* will play an important part in finding the answers for the dairy industry.

(Left) 3,000-gallon storage tanks hold skim milk and cream in readiness for various mix operations. Operator supplies exact amount of skim milk or cream needed by simple adjustment of meters. (Center) The sweetwater cooler is a completely automatic operation that can drop 1,250 gallons of skim milk an hour from about 160° to 28° F in a matter of seconds. (Right) Production-line operator checks flow of cream for ice-cream mix being prepared in a 500-gallon pasteurizer. By means of dial controls, a scale automatically measures out the amounts of the ingredients that will make up the mix.





NEW VENTILATING SYSTEM FOR POTATO STORAGES

by RICHARD S. CLAYCOMB

A NEW METHOD of ventilation and temperature control for potato storages has been developed by AMS engineers at the East Grand Forks, Minn., research station.

It's called envelope circulation, and its purpose is to reduce potato shrinkage and weight loss during the storage period.

Already put into commercial operation, the new system keeps the potatoes surrounded by moist air. Dry air is kept out of the storage by confining it to a closed area that surrounds the storage compartment.

Because the cool dry air is kept within the envelope—and out of the storage—evaporation and shrinkage are minimized.

Envelope circulation is under study and further development at a plant located at Questa, N. Mex. Here, a model storage, built according to AMS specifications, has been erected. Made entirely of steel and concrete, this building has a normal capacity of 25 million pounds. In years of unusually high yield, however, as

much as 30 million pounds of potatoes could be stored.

Between the inner and outer walls of this giant structure, a blanket of air is constantly in circulation, giving up and receiving heat as it passes. Overhead, across the top of the structure, more air is sandwiched between an acre and a half of corrugated steel ceiling and insulated roof.

The surface exposed to the potatoes is steel, a good vapor barrier when properly caulked. It transfers heat readily but does not allow passage of water vapor.

Thermostats, damper motors, and mixing dampers control the temperature of the air mix that flows through the envelope. Cool air from outside and warm air from the envelope are mixed in the proper proportions, and fans maintain continuous air movement.

For temperature control purposes, the storage is divided into four compartments. Each of these areas may be operated independently.

As yet, the results of this storage operation have not been compiled. They will be published later in an AMS report.

Potatoes in Poly Bags Need Ventilation

Polyethylene bags continue to be popular containers for 5- and 10-pound units of potatoes. But there are reports of more decay in potatoes packaged in film bags than in other containers.

AMS researchers say the increase in spoilage usually comes from high humidities within the bag. This condition results from inadequate ventilation.

A USDA study shows that 10-pound polyethylene bags should have about 64 $\frac{1}{4}$ -inch perforations. Five-pound bags should have at least half that many. This should be adequate for potatoes packed damp or dry.

Without adequate ventilation in poly bags, fogging and surface mold may be extensive. In an infected lot, decay may be worse than in conventional consumer bags.

It Takes Little Light To Cause Potato Greening

Greening is a recognized problem in the storing and marketing of potatoes. One point not too widely recognized is that it takes very little light to cause greening, which develops in proportion to the amount of light received. Long exposures to diffused light in storage or warehouse can cause greening.

Varieties differ in their susceptibility to greening. Most varieties green more readily early in storage, and progressively less with prolonged storage, when exposed to light.

AMS tests at Beltsville and in the Red River Valley showed that potatoes green the most in transparent film and mesh bags, an intermediate amount in kraft window bags, and none in solid kraft-paper bags.

Potatoes in transparent bags can be displayed under light for approximately 3 days without appreciable greening.

Reserve stocks in stores should be held in the dark. Humidity in the air has no effect on amount of greening.

The author is an agricultural engineer at the Red River Valley Potato Research Center, East Grand Forks, Minn.

CUTTING COSTS FOR TUNG FRUIT

by LEWIS A. BAUMANN

IF TUNG NUTS are stored off the ground after harvest, a producer can save almost a dollar a ton in hauling and processing charges.

This saving is possible because of the lower moisture content of tree or bin-stored fruit. The less moisture in the fruit, the less its weight. And, weight determines both these charges.

Weight also serves as a basis in figuring how much oil the fruit will net. Oil content—which is actually what the tung nut producer is selling—is calculated as a percentage of total weight of the nuts as delivered at the processor's mill.

So, it's just good business to keep the moisture content of harvested tung nuts as low as possible. Research personnel in the Agricultural Marketing Service believe off-the-ground storages may be the producer's best bet for cutting costs.

Here, hulls are separated from kernels and seeds. They account for half the weight of tung fruit.



Before reaching this conclusion, AMS economists studied samples from some 550 loads of tung fruit. These samples came from Louisiana, Mississippi, and Florida during the 1954-55 and the 1956-57 harvesting season.

The amount of oil in these samples varied from 8.1 to 25.3 percent of the total weight of the fruit. About half had an oil content of 15 to 19.6 percent.

At 22 cents a pound for oil, this meant the producer might get anywhere from \$66 to \$86 a ton for his tung fruit.

Some of this variation in oil content—and in the return to the grower—was due to the sampling method, including the size and number of samples. Much, however, also resulted from the method of storage.

Clean dry fruit for the two seasons showed no significant difference in oil content. But there was a noticeable difference in bin-stored and ground-stored fruit as delivered to the mills. This clearly marked ground storage as the villain; it increased the moisture in the fruit, and, consequently, lowered the oil content.

For example, in 1956-57, ground-stored fruit contained about 7.5 percent more moisture than fruit stored in bins. That marketing season, about 65 percent of all tung fruit was stored on the ground. If, instead, producers had tree or bin-stored even half the year's production—or, about 50,000 tons—they could have saved \$50,000 in hauling and processing charges for their custom-milled tung fruit.



Researchers believe off-the-ground storage may be the producer's best bet for keeping moisture in harvested tung nuts as low as possible.

Producers could also cut down their hauling and processing costs by hulling the nuts at the farm. The hulls account for about half the weight of the whole fruit and from 65 to 85 percent of the moisture content. Carting hulls to the processor is simply an added expense.

Here's how AMS economists figured the costs and returns for a ton of tung fruit, from orchard to final sale. About \$2.50 went for hauling and \$13 for processing. The net price of the oil was 21.5 cents per pound. Thus, for his ton of fruit the producer received \$64.33 and paid out \$15.50. His net return, then, was \$48.83.

Obviously, if the oil content of the fruit were higher, or the unit charges for hauling and processing were lower, the producer would have more money at the end of the season.

But, marketing researchers warn against the indiscriminate purchase of equipment for field hulling and bin storage. Such facilities and equipment are costly and add to production costs. Usually, they are only profitable to large-scale growers. However, smaller growers might pool their resources to buy the necessary machinery and thereby also reap increased returns from their tung fruit.

The author is a specialist in the Marketing Research Division of AMS.

Improved Methods for Packaging and Price-Marking Produce In Retail Food Stores

by PAUL SHAFFER

A PENNY SAVED is still a penny earned, even in these days of rising labor costs. In the management of a produce department in a retail food store, this is especially true.

There are a lot of little ways to increase labor efficiency and reduce costs in the marketing of agricultural products. Although small in themselves, together they add up to quite a saving.

Take just one phase of the retail produce operation, for example: Packaging and price marking.

In four supermarkets studied by Agricultural Marketing Service, improved packaging and price marking methods resulted in a weekly savings of from \$22 to \$67. The larger saving, of course, was realized in the store which had the largest number of unit sales.

The most important item in bringing down handling costs was the use of a specially designed packaging table. This one unit reduced labor costs 38 percent over a bench-type wrap station and 30 percent over con-

ventional individual wrap tables.

Several labor-saving principles were incorporated into the packaging table. First of all, the table was of the proper height to permit alternate sitting and standing. It placed all the tools and materials directly in front of the worker. The unwrapped fruits and vegetables were close at hand on the right, and there was ample room at the left to deposit the wrapped merchandise. A gravity conveyor arrangement moved the produce through the packaging operation.

Each packager had his own table completely equipped with tools and packaging materials. The area itself was well ventilated, light, and quiet.

The output of a worker in this ideal packaging situation is obviously much greater than of a worker who must improvise as he goes along, doing the job as best he can with make-shift equipment.

The AMS-designed packaging table produced a saving of \$3.87 per 1,000 units when compared to the bench-type wrap station and \$2.71 per 1,000 over conventional individual wrap tables.



A specially designed packaging table places all tools and materials directly in front of worker.

Further savings resulted from a more efficient method of filling polyethylene bags. By using a semiautomatic bagger, labor costs were \$4.80 less per 1,000 units than by hand filling and \$3.10 less than when an especially designed bagging table was used.

The electrically operated bagging device was particularly effective in packaging potatoes and onions. For both these commodities, it proved more efficient than hand filling—14 percent less costly for 3-pound bags of onions, 39 percent for 5 pounds of potatoes, and 45 percent less for 10-pound bags of potatoes.

Automatic bagging also worked well for bagging oranges, grapefruit, and apples, but for these items the operator should use a special hopper adapter to avoid bruising.

The lowest cost method of preparing lettuce was with a wire-enclosed paper tie. Labor and materials for this method came to \$16.70 per 1,000 heads compared with \$23.80 for handwrapping in cellophane. The savings here amounted to \$7.10 per 1,000 heads.

Open front funnel, an AMS development, accommodates poly bag sizes from 2 to 10 pounds. A raised lip built around edge of funnel on surface of packaging table keeps produce from falling to floor.

A sloping table and a 3-sided well on over-under fan-type scale for packaging potatoes.





A gravity conveyor arrangement moves produce from new table through packaging operation.



This semi-automatic bagger is particularly effective for packaging potatoes and onions.



12 Tangerines 39
10# IDAHO 50

Self-inking multi-band adjustable stamp marks weight, commodity, price of packaged produce.

However, a complete film covering offers more protection to the lettuce than a wire-enclosed paper tie. Of the film wraps, handwrapped cellophane was the lowest cost method. It ran \$3.60 less than cellophane bags.

Weighing and labeling offered another big area of savings. For outside labels, the combined use of a label printer and scales provides the retailer with a low-cost operation. If his volume is over 4,000 packages a week, an electronic device which weighs the product, computes its cost, and prints the ticket is his best bet. In a year, the electronic printer-scale, doing the same job as conventional handling methods, saves: \$1,032 for an output of 6,000 packages weekly; \$1,860 for 9,000 units; and \$2,685 for 12,000 packages.

For weighing and labeling polyethylene bags, the situation is somewhat different. The most efficient method depends upon whether the bag is filled catch weight or even weight.

When catch weights were used and the packaging operation ran between 2,500 and 4,000 units per week, the

A lightweight aluminum scoop—capacity five pounds—is used for filling kraft-type bags.



separate label printer and scale combination was the least expensive. Savings ran about \$2.30 per 1,000 packages less than the cost of handwriting the information on the bag.

But, if the weekly volume is greater than 4,000 units, the electronic computer-scale-printer would be the lowest cost method.

For bags filled to the same weight, an adjustable stamp with a code, commodity identification, weight, and price listing worked best. Compared with a price stamp and handwritten code, identification, and weight listing, the complete stamp saved \$4.20 per 1,000 bags. If the date code is not required on the packages, a self-inking stamp may be used to further decrease time requirements and labor costs.

In every case—for both catch and even weight packages—writing the price on the bag with a grease pencil proved the least efficient and most time-consuming.

These are but a few of the labor-saving methods that can be used to cut down the cost of prepackaging and price marking fresh fruits and vegetables in the retail store. Most of the savings are small when quoted on a per 1,000 basis. But added up for a week, a month, and a year, then multiplied by the number of stores performing this operation, these savings grow large. The pennies become dollars, and the potential saving runs to several million.



Adjustable stamp prints weight, commodity store code, and price. It is not self-inking.



An electronic printer-scaler weighs product, computes its cost, and prints ticket. It provides the retailer with a low-cost operation.

OFFICIAL BUSINESS

Trends in Prepackaging Fresh Produce

by THOMAS B. SMITH

THE prepackaging industry—one of the most dynamic in food marketing today—is gaining new momentum by adding more and more fruits and vegetables to its already long list of commodities. And, not only is the number of items increasing, but so too is the quantity of those now being prepackaged.

An Agricultural Marketing Service survey of 217 fresh fruit and vegetable packing plants throughout the United States showed that at least 50 different commodities were prepackaged in consumer units in 1954-55.

The more common of these were apples, carrots, celery, oranges, potatoes, radishes, tomatoes, and spinach.

These, and a wide variety of other fruits and vegetables, were being offered to the consumer in attractive, convenient cartons and bags. The variety of the containers was almost as varied as the produce which they carried.

Most often, packages were transparent film bags, cartons, trays, plastic baskets, and paper bags with mesh or film windows. Film bags used for produce were generally either polyethylene or cellophane film—polyethylene for root vegetables, citrus, and apples; cellophane for leafy vegetables.

Cartons and trays were usually

overwrapped with cellophane or cellulose acetate film. Sometimes they were wrapped with a band of film or capped with a sheet of film held in place with a rubber band. Acetate film window cartons were commonly used for tomatoes and mushrooms.

Although fresh fruits and vegetables were prepackaged at four different levels in the marketing process, the nationwide survey conducted by AMS was concerned primarily with centralized plants that packaged more than one commodity. However, some operations at a point of production or in plants of service wholesalers were included. Of these plants, 76 percent handled 1 to 6 commodities, while the remaining 24 percent packaged from 7 to 15.

To make distribution easier and quicker, these centralized packaging plants usually were located in or near a large city. This location put them close to the retail chain stores which were the principal users of prepackaged products. Retail chain stores took about 42 percent of the total output; independent retail stores about 19 percent; wholesalers, 25 percent; jobbers, 11 percent; and about 3 percent went to brokers.

Approximately 41 percent of the packaged commodities was distributed less than 25 miles from the plants. Eighteen percent traveled 25 to 49 miles, 13 percent from 50 to 99 miles, and only 28 percent journeyed more than 100 miles away.

The major portion of the produce moved from the packaging plants to the buyers in unrefrigerated trucks operated by the packagers. However, a small quantity of packaged produce was picked up at the plants by the buyers. Some refrigerated trucks were used, but the percentage was small.

At the plant, the size of the packaging line and the number of workers varied with the type of commodity packaged. Leafy and most root vegetables usually require more attention than fruits.

Packagers wash and inspect leafy green vegetables several times before they reach the packaging station. Many plants have elaborate pressurized water spray systems that remove sand and other foreign material from leafy greens much more effectively than most housewives could hope to do at home. Because of this extra attention given to leafy and root vegetables, 37 percent of the packaging plants handling these products used more than 10 workers on a line.

Fruits, on the other hand, do not require as much special handling. They often arrive at the plant already sized and graded. Only 12 percent of the fruit packaging lines used more than 10 workers.

Most plants employed both machinery and hand labor on the packaging lines. When a line was mechanized, the machinery and equipment cost anywhere up to \$138,000. Usually, though, it was \$10,000 or less.

The author is a staff member of the Marketing Research Division of AMS.